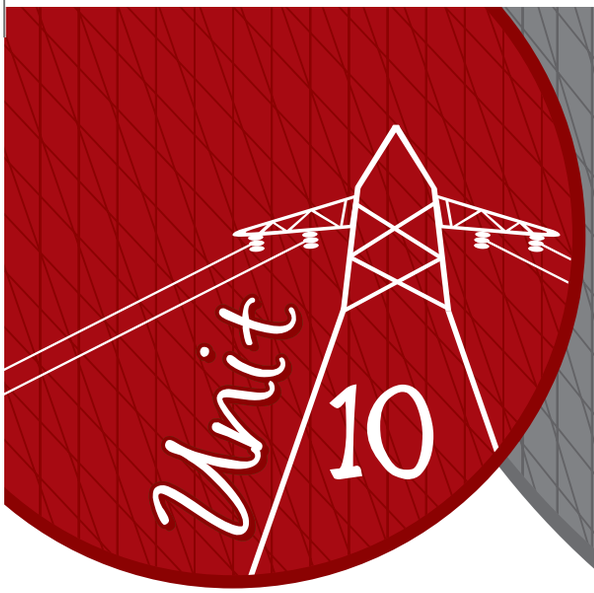

Hazards with Panel Assembly and Wiring

Introduction

While assembling panel components, one may have to deal with hazards associated with the panel assembly process. Therefore, one must be aware of the hazards associated with wiring a control panel or while assembling the components in a panel assembly. Many hazards can be avoided by taking appropriate precautions. This will ensure safety at workplace. Points that may lead to hazards are as follows.

- Exposure to high electromagnetic fields
- Electrical fires due to faulty and outdated wiring and use of faulty components
- Electric shock due to faulty grounding of electrical equipment
- Defective or inadequate insulation on electrical cables

To avoid electrical hazards, follow these precautions.

- Ensure the power tools to be used in the assembly process include extension cord of appropriate rating.
- Do not use damaged electric tools.
- Inspect and test the installed electrical equipment and system at regular intervals.

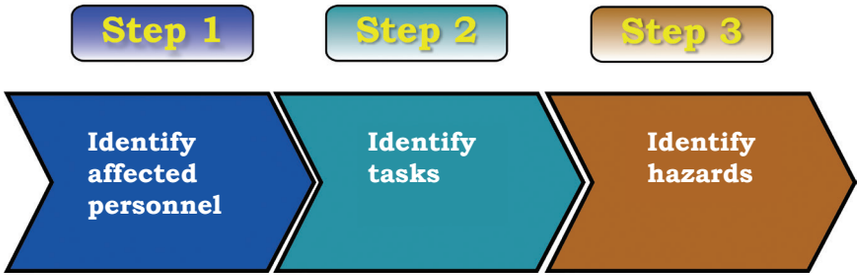

Fig. 10.1 People, task and hazard identification

- Check the rating and physical condition of the components and cables.
- Use standard techniques for assembling the components.
- Use personal protective equipment for safety purpose.

Handling heavy and hazardous material

Handling loads manually may cause cumulative disorders, such as back pain, musculoskeletal disorders, and so on, due to continuous lifting or handling of heavy machines and equipment.

The following points must be taken into account to reduce risks associated with handling of heavy and hazardous loads.

- Identify the hazard
- Assess the risk
- Select appropriate measures to control or reduce the risk

Common injuries that can be caused due to lifting heavy loads include backache, neck strain, wrist sprain, back sprain, shoulder pain, and so on. Similarly, some common injuries associated with handling of hazardous material include dermatitis, occupational respiratory and lung ailments, and so on. Therefore, it is mandatory to follow the standard safety procedures while handling equipment, hazardous material or tools.

The following measures are some of the key points that must be taken care of while handling hazardous material.

- Use machines to lift or carry hazardous material.

- Use personal protective equipment, such as boots, gloves, helmets, goggles, and so on.
- Work in a team while handling heavy loads.

Maintaining correct posture while working

A wireman must maintain the correct posture while working, whether in squatting, standing or bending position. When trying to pick up a tool or equipment while wiring at a height, one tends to stretch the body. This stretch may cause injuries. Moreover, when wiring a control panel in racks and cabinets, one is required to work in uncomfortable positions, which may harm the back, neck and limbs. Therefore, it becomes important to take precautions while working to ensure that no harm is caused to the body (Fig. 10.2).

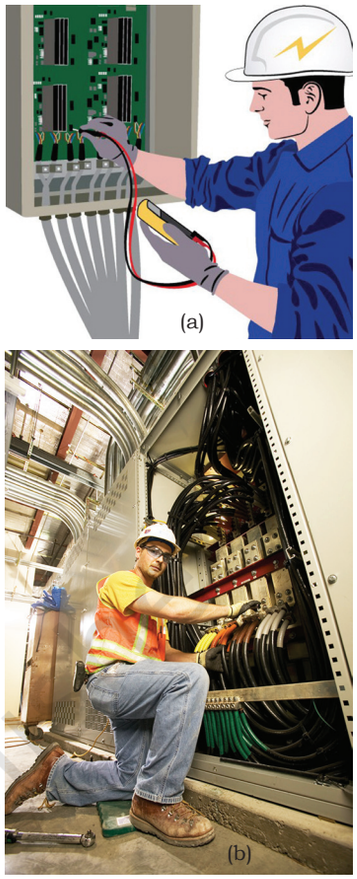

Fig. 10.2 (a and b) Wiremen working in different positions

Some of the precautions that one must take while working include the following.

- Follow the correct posture while working on a table for wiring or soldering as shown in Fig. 10.3.

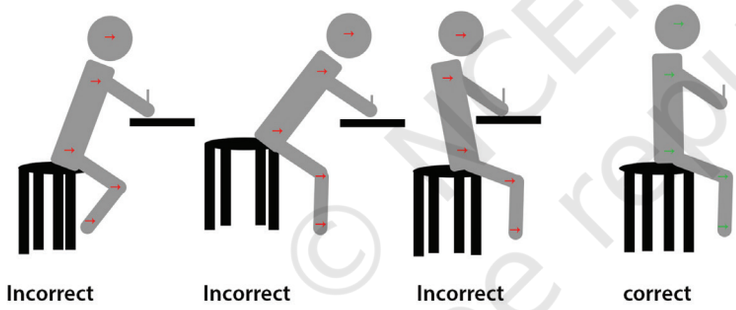

Fig.10.3 Incorrect and correct postures while working on a table

- Keep stretching the arms, legs, neck and back while working to ensure that they are not strained.
- Follow the correct way for lifting heavy boxes or other material as shown in Fig. 10.4.

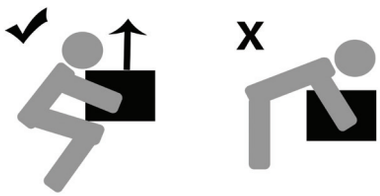

Fig. 10.4 Correct and incorrect way of bending and lifting

How electricity works

The wireman must know the way electricity flows through a circuit. The person must also have the knowledge of the material and equipment used for insulation. The first step in preventing a dangerous

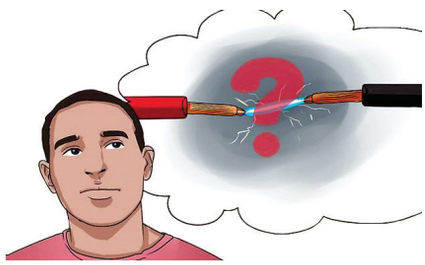
Fig. 10.5 Remember the cause of shock in an electrical system

situation is to understand the cause of an electric shock (Fig. 10.5).

- Natural current follows the least resistive path, and flows to the earth or ground through the material that conducts electric current.
- Due to the presence of sodium and water in human and animal body, current can easily flow through them. When electric current passes through a human body, the person experiences electric shock. Material like wood and glass are poor conductors of electricity, whereas, seawater and metals are good conductors.
- Incidence of experiencing electric shock often happens when a person is exposed to direct source of electricity. Electric current may flow in a human body through water, metallic rod or pole, etc.

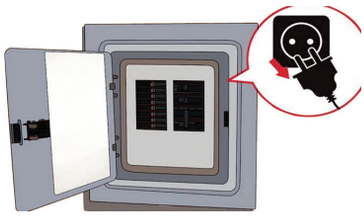

Fig.10.6 Control panel board

Electric appliances used in homes have their own electrical specifications. Therefore, one needs to know about the type of circuit breakers, fuses and light bulbs required in our homes (Fig. 10.6). One must replace them with the right parts when needed. Using unspecified parts may hamper an equipment's functioning. It may create an unsafe condition that may lead to fire, injury or even death.

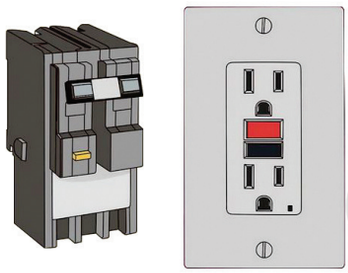

Fig.10.7 Types of circuit breaker

Preventing electric shock at workplace

Install breakers

Ground fault circuit interrupter (GFCI) device is used to measure the imbalance occurring in an electric appliance.

Fig. 10.8 Mistakes made while installing a socket

Avoid common mistakes

Avoid making common mistakes when trying to install electrical system or working on the electric system. Avoid touching a bare wire that may be carrying electric current or a wire with bare handle.

Replace damaged equipment

Inspect electrical devices at regular intervals and maintain them. Some signs that indicate a need for repair are:

(a) sparking
(b) experiencing minor shocks
(c) frayed or damaged cords
(d) heat from electrical outlets
(e) frequent short circuit

These are the few signs of wear and tear in an equipment or appliance. If something unusual is noticed, contact an electrician immediately.

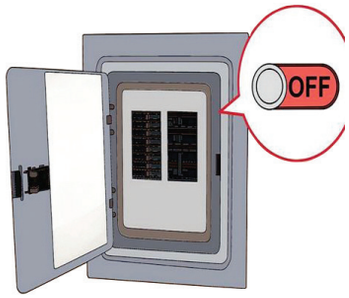

Fig. 10.9 Turn off the control panel

Turn off the power source

Whenever a project involves exposure to electrical equipment or electricity, check whether the power is off before starting the work (as shown in Fig. 10.9). Again, there should be a main electric panel for the entire facility. Find out this panel and turn the switch off.

Wear protective gear

Use rubber sole shoes and gloves. Also, put a rubber mat on the floor. Putting all these is an effective precaution as rubber does not conduct electricity and will prevent a person from getting electric shock (Fig. 10.10).


Fig. 10.10 Rubber shoes and gloves prevent a person from electric shock

Exercise caution when operating power tools

Make sure that all tools have a three-pronged plug (as shown in Fig. 10.11) and look for signs of damage in the tools. Always turn off the switch of power tools before connecting them to the socket. Always keep the electric power tools away from water. Besides, when using an electric power tool, keep the work area free from flammable gases, vapour and solvents.

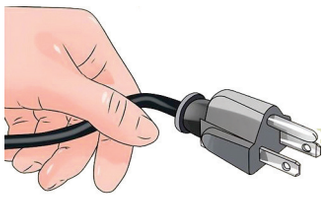
Fig. 10.11 Three-pin plug

Double up

It is always wise to have a second person around to assist you when installing the panel (Fig. 10.12). This person can double check to ensure that all necessary precautions are being followed. Also, if something goes wrong and the person working gets an electric shock, this second person can immediately provide help.

Make sure to communicate well with the other person. Many electrical accidents occur because of

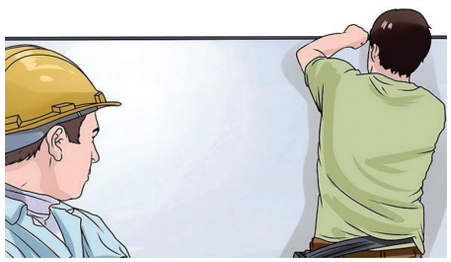
Fig. 10.12 The second person conducts a check

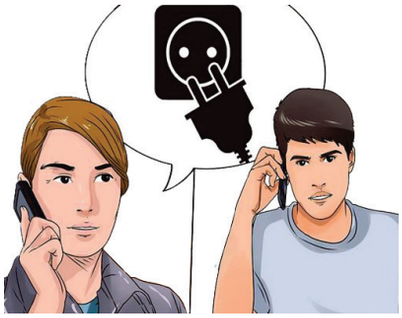

Fig.10.13 Calling a electrician

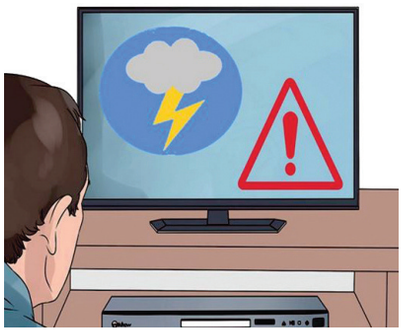

Fig.10.14 Checking the weather report

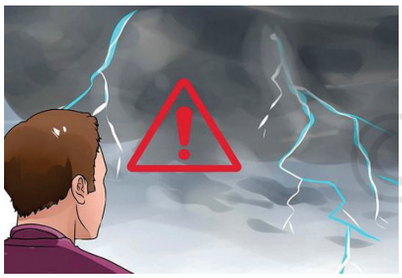

Fig.10.15 Watch out for signs of storm

Fig. 10.16 Do not touch the victim with bare hands

miscommunication. The person must carefully listen when the second person says the power of the control panel is OFF or ON.

Even if you trust this person, it is important to double check and make sure that the power is off. Never assume anything when dealing with electricity as a small lapse may result in a major accident.

Call a professional for major works

Working with electricity is dangerous and complicated. If a person is not confident, rope in an electrician to complete the job as shown in Fig. 10.13.

Preventing electric shock in lightning storm

Check the weather report

When working outside, one must make sure that the weather is clear. Also, check the weather forecast for ensuring safety (Fig. 10.14). Even if one has an afternoon work, the weather can change in no time and the best precaution is preparedness. Check for chances of thunderstorm in an outdoor area you plan to install the panel. One must change the plan accordingly, if needed and wait for the weather condition to become normal.

Watch out for signs of storm

Regularly monitor the changes in temperature, increase in wind speed or darkening of the sky (Fig. 10.15). If it looks like a storm rolling in, cover the panel and stop the work immediately and look for shelter.

Do not touch a victim with bare hands

Shock victims, usually, do not hold electricity in their bodies for very long time. However, always be cautious when touching the victim of electrocution as the person may still be carrying the current (Fig. 10.16). Use a non-conductive material to touch the victim like rubber gloves, wooden stick, etc.

Turn off the power supply

If possible, turn off the power supply. But, one must make sure that one is cautious and takes necessary precautions to avoid getting an electric shock. Move the victim away from near the power source with the help of a non-conductive material like a wooden stick as shown in Fig. 10.17(b).

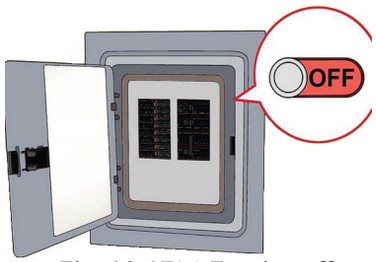

Fig. 10.17(a) Turning off the power supply

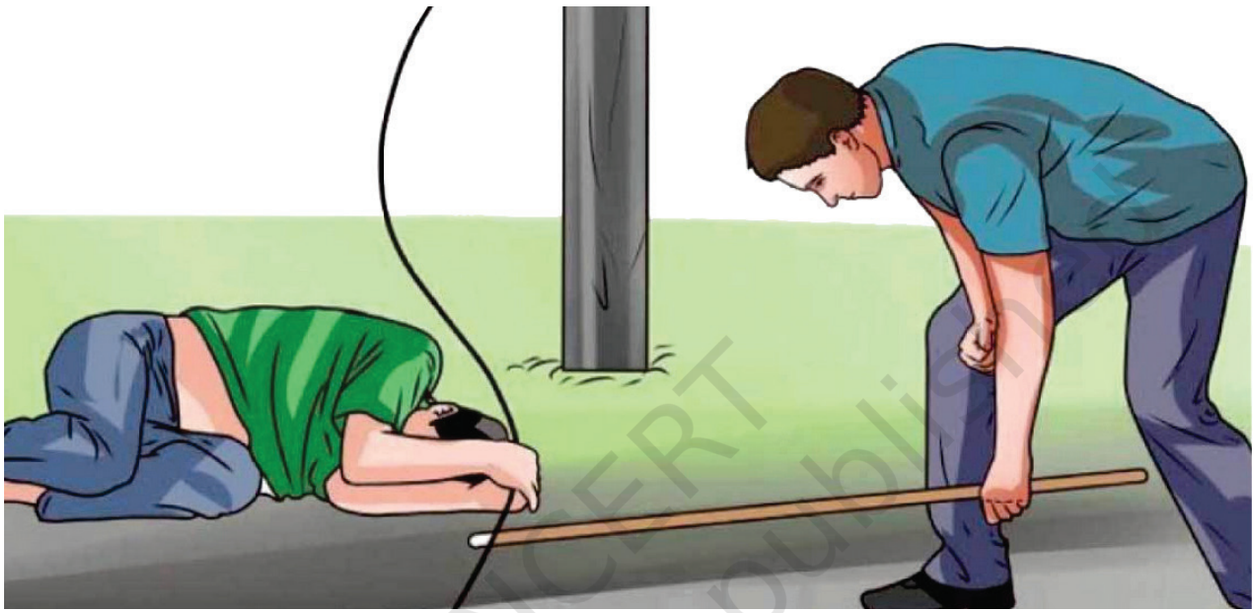

Fig. 10.17(b) Using a wooden stick to move away a live wire from a victim

Fire extinguisher

Often used in emergency situations, a fire extinguisher is an equipment used to extinguish or control small fire. It is a cylindrical pressure vessel, containing an agent, which can be discharged to cease or control fire. The equipment must always be available in areas involving work with electrical equipment. The extinguishers used to douse electrical fires are labeled as class 'C', 'BC' or 'ABC'. Fig. 10.18 shows the parts of a fire extinguisher.

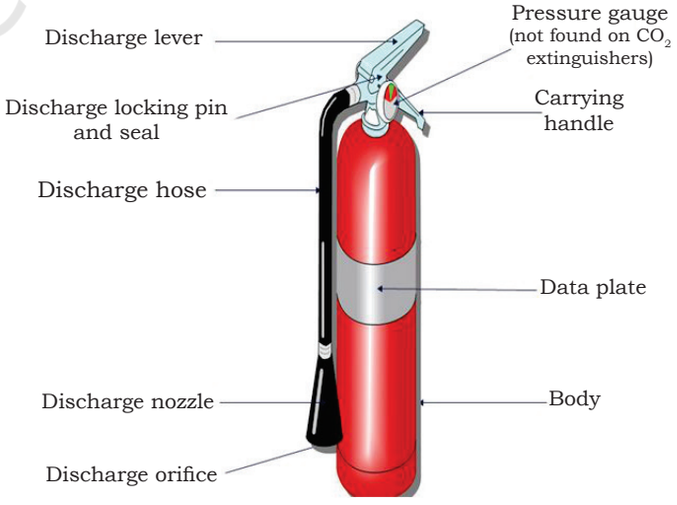

Fig.10.18 Fire extinguisher

The steps to operate a fire extinguisher in case of an emergency has been shown in Fig. 10.19.

Step 1	Identify the safety pin of the fire extinguisher, which is, generally, present in its handle.
Step 2	Break the seal and pull the safety pin from the handle.
Step 3	Use the fire extinguisher by squeezing the lever.

Fig. 10.19 Steps to open the seal and safety pin

The steps to use a fire extinguisher can easily be memorised by the word PASS as shown in Fig. 10.20.

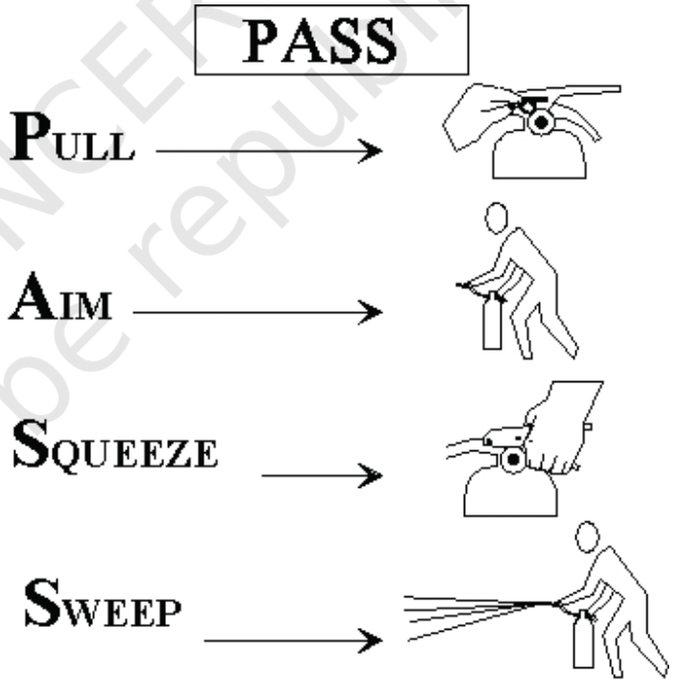

Fig. 10.20 Steps to use a fire extinguisher

Precautions

One must follow some safety or precautionary measures to ensure that the work area is safe. Some of the

precautions that one must follow while working include the following.

- Observe if there is a risk of fire in or near the work area.
- Be alert and keep the work area free from untidy things so that if a fire breaks out, it can be easily noticed, and hence, controlled.
- Ensure that all exit gates are clear and easily accessible during emergency evacuation.
- Observe and immediately report, if any fire-fighting equipment, such as a sand bucket or fire extinguisher is missing or not working.
- Ensure that all safety equipment are maintained. Cases of negligence must be reported immediately.
- Ensure that people do not smoke near electrical equipment or machinery or any other material, which may catch fire easily.

First aid

First aid is of prime importance in the event of an accident. Hence, everybody must have the knowledge of the basic first aid practices, which may include the following.

- Bring the affected person to a noise-free, less crowded and open place. Ensure that the person does not feel suffocated.
- Keep the affected body parts of the victim in straight position and lay down the person on the spot, if required.
- In case of head injury, lay down the person in a way that the head rests in an upward position.
- If the victim is having trouble in breathing, then the person must be kept in sitting position.
- If the victim is in an epileptic condition, then lay the person down ensuring that the head is below the level of the body.

Fig. 10.21 Basic first aid kit

- If the victim has wounds, then take water in a small bucket and add four drops of iodine to it to make it anti-bacterial. Now, wash the wounds neatly and carefully, and allow it to dry. Then, apply iodine on the wounds and wrap them with medicated or anti-bacterial cotton.

Note: In case of an emergency, try to remain calm. A person can act effectively with calmness.

The following medicines or items must be kept in the first aid box.

- Dressing cotton
- Yellow or dressing pad for burn injuries
- Clean and sterilised cotton pads
- Tincture iodine
- Potassium permanganate
- Adhesive plaster
- Eye drops
- Boric powder
- Tourniquet
- Three-angle bandage (in case of broken bone)

- Safety pins
- Soda-bi-carbon
- 2 or 3 wooden plaques
- Aspirin tablets
- Bottle of antiseptic liquid
- Bottle of spirit
- Scissor, knife, etc.

Types of injury

Workplace injuries can occur in all kinds of work environment. Some of the injuries are as follows.

Bleeding

There can be four types of bleeding through injuries, which are as follows.

- Minor bleeding
- Bleeding through the arteries or main blood circulatory system
- Bleeding from the veins
- Internal bleeding

In case of minor bleeding or bleeding from the veins, tightly wrap the body part above and below the wound for the bleeding to stop. Internal bleeding, such as in stomach, from brain or lungs, etc., cannot be seen. However, it can be seen in the vomit or spit of the injured person. Internal bleeding is dangerous as compared to external bleeding. In such a situation, give the injured person cold water or ice and arrange for immediate medical help. Excessive bleeding after injury may even cause death. Hence, medical help must be arranged without delay.

Bone injury

In case of accidents, sometimes the bones of the body may break, and the tip of the broken part may be visible in the wound. In such cases, first try to stop bleeding without touching the wounded part. Wrap the broken body part by resting it on wooden plank and take the injured person to a hospital as soon as possible.

Fig. 10.22 Monitoring the breathing of an unconscious person

If the bones of legs are broken, then the injured person must be taken on a stretcher.

Unconsciousness

If the person loses consciousness, open the airway and monitor the person's breathing. If breathing becomes difficult, call other people for help to admit the person to a hospital immediately. Put your hands over the person's ears to keep the head aligned. Roll the victim over gently, making sure that you keep the neck and back aligned at all times, joining the hands of all team members like a stretcher.

Fig. 10.23 Burn injury

Burns

Severe burns may affect all layers of the skin or cover a large area of the body (Fig. 10.23). The aim of first aid treatment for severe burns is to cool the affected area rapidly with cold water, placing cold wet towels on the area, or applying cooling lotions to reduce the burning sensation, prevent loss of body fluids and other damages. Try to reduce the pain and injury using first aid as any negligence may harm the tissues and internal body parts. If the person is injured on a larger part of the body, the person must immediately be shifted to the hospital.

If the person's clothing catches fire, immediately bring the victim to the ground and use a blanket, rug or coat to douse the flames. Immerse the burnt part of the person's body in cool water or cover it with cold wet towels for at least 10 minutes. If the burn injuries are due to acid action, then the wound must be washed and cleaned with baking soda water. If the burn injury is caused due to carbolic acid, it must be cleaned and washed with spirit.

Tips

- Do not apply any ointment on the burns unless recommended by a doctor.

- Do not touch the burns or burst the blisters.
- Do not put ice on the burnt part.
- Do not apply iodine on such wounds.

Electrocution

When a worker is electrocuted, the following measures must be taken.

- First disconnect the power supply. If possible, send someone for disconnecting the supply.
- If the person is in contact with a live wire or a faulty equipment, one must not touch the victim with bare hands even if one is standing on a wooden plank as current may pass through the victim's body and the moisture present in the wooden plank may cause electric shock to the rescuer as well.
- If the person comes in contact with a low-tension transmission line, then the rescuer must wear rubber gumboots and gloves while carrying out the rescue work. If electric shock is due to high-tension transmission line, then the safety gear used for separation must have the capacity to resist high voltage. In case, appropriate safety gear is not available, do not touch the victim. However, confirm that the things used for such operations are dry and insulated.
- After removing or isolating the electrocuted person from live wire or equipment, first loosen the person's clothes. Remove material, such as tobacco, betel nuts or artificial teeth from the victim's mouth. If the respiration system has failed, try to give artificial respiration immediately to the person.
- If the electrocuted person becomes unconscious, do not give any drink, water, etc., to the person.
- Apply ointments like Burnol or Soframycin on the burnt area and put on a bandage. The wound must not come in contact of air.
- Keep the person warm by wrapping a blanket or coat. If possible, both the feet of the victim should be kept in warm water.

NOTES

After the person gains consciousness, do the following things.

- Call the doctor immediately and continue with artificial respiration.
- Offer adequate water mixed with sodium bicarbonate to the electrocuted person.
- Give the victim salt to inhale.
- If the victim's throat is injured or the person has pain in the throat, no drink or water must be given unless advised by the doctor.
- If the person passes urine, keep the urine sample for pathological tests.
- Do not do anything, which can cause mental or physical stress to the person till doctor is available.
- If the person becomes normal, allow the person some rest.

Tips

In case of electrocution:

- take remedial measures immediately without any delay.
- a delay may even cause the death of the victim.
- timely aid and remedial measures may save the life of an electrocuted person.
- the heart muscles remain alive for up to half-an hour. Hence, artificial respiration may help save the life of the person.
- continue artificial respiration till doctor or medical help arrives.

Artificial respiration (cardiopulmonary resuscitation)

Artificial respiration is given when a person's respiration fails. These are some of the methods used for giving artificial respiration.

Mouth-to-mouth method

In this method, stand up near the head of the electrocuted person or sit on your knees. The person's head must be kept in downward position by pushing it with one

hand, and with the other hand lift the person's lower jaw. Take a deep breath and keep your open mouth onto the mouth of the electrocuted person. Close both the nostrils of the person with one hand and exhale. Observe whether the chest of the person expands or not (Fig.10.24).

Fig. 10.24 Mouth-to-mouth respiration

Keep your mouth away and again inhale. Repeat the procedure as mentioned above. Try to repeat such artificial respiration for 10 to 12 times in a minute. If there is some difficulty in doing so, try to push the person's head and again pull the lower jaw. If you again find it difficult to give this treatment, see whether the lips of the person are open and try to see if the teeth are jammed. If so, then use mouth-to-nose method.

Mouth-to-nose method

In case giving mouth-to-mouth respiration is difficult, try mouth-to-nose method. In this process, stand near the head of the person or sit on your knees. Push the victim's head downwards and pull up the lower jaw. Then, take a deep breath. Put one hand on the forehead of the electrocuted person, and with the other hand, close the mouth of the person tightly and exhale through the mouth into the nose of person slowly so that air enters the person's lungs. See if the chest expands. The same procedure must be repeated 10 to 12 times in a minute (Fig. 10.25).

When the person starts breathing on one's own, give this breathing in a synchronous way and see if the chest expands. When the person comes to a comfortable position, allow the person some rest. Put the person on a stretcher and observe if there is any difficulty in respiration. The person's body must be wrapped in a blanket and kept warm. The person who fell unconscious due to electric shock may even get immediate cardiac problem. Thus, every worker must know this method and try to get training in carrying out the procedure.

Fig.10.25 Mouth-to-nose respiration

Tips

1. If mouth-to-nose respiration is done, air will travel slowly to the electrocuted person's lungs. In case, the nose of the electrocuted person is very narrow, then the system of mouth-to-mouth should be preferred.
2. If it is observed that the throat of the person is very narrow or clogged, then it must be cleaned.
3. In case, the teeth of the person are jammed, then use the mouth-to-nose method.
4. If possible, keep a thin handkerchief on the mouth of the person for mouth-to-mouth procedure.
5. For infant or young children, blow air from your mouth. At least 20 times per minute respiration is required.
6. In case the victim is in contact with an electric pole and artificial respiration has to be given, one must first safeguard oneself from the live parts and also avoid coming in contact with the victim. One must stand carefully on the pole by using a safety belt so that one is able to place the mouth onto the mouth or nose of the electrocuted person.

Holger Nelson method

In this procedure, first lay down the person in a downward position and keep the person's hands at the back in crossed position. Keep the neck on one side and apply light pressure. Keep your right knee near the head of the person and feet near the person's elbow. Put your palms on the back of the affected person in such a way that the thumbs of both your hands rest on the backbone of the person. Then, start giving light pressure with both the palms on the back of the affected person. Keep this position for 2–5 seconds, and then, start releasing the pressure slowly from the back. Now, hold the arms of the person, and put the person's hands in upward position and pull them forward. The procedure must be repeated 10 to 12 times per minute till the person starts breathing on one's own.

Schaefer's method

In this method, lay down the injured person in such a way that the stomach is in contact with the surface. Put pillow or clothes below the person's head. Now, slowly turn the person's head in either right or left direction. The rescuer must sit down on one's knees in crossed-legged position so that the person covers the victim. Next, the rescuer must put both the thumbs on the back side of the injured person. The rescuer must place the other fingers on the back side of the victim's forearm from both the side and apply constant pressure on the back. Then, the pressure must be relased. One must do this step 15 times per minute. This leads to the expansion and contraction of lung muscles of the victim, which helps ensure continuous respiration. One thing that must be followed is that pressure must be given slowly to ensure inhaling and exhaling action in the victim. The amount of pressure must be synchronised with the breathing of the affected person. This procedure must be continued until the victim starts breathing on one's own. This exercise may take half-an-hour or more. The pressure needs to be of 20–25 pounds for adult males, 10–15 pounds for adult females and children.

(a) Exhalation

(b) Inhalation

Fig. 10.26 (a and b) Schaefer's respiration method

Sylverester's method

Lay down the electrocuted person in upward position. Loosen the clothes on the person's chest and stomach. A pillow must be placed below the person's shoulder in such a way that the neck and head of the affected person are in downward position. Then, pull out the victim's tongue. The person administering the treatment must sit on the knees near the affected person. Keep the hands of the person below the elbow and pull the victim's hands till they become parallel to the earth. This treatment must be given for 3 seconds. After that,

bring both the hands of the person below the chest and press the chest lightly. This action must be done for 2 seconds. The procedure must be repeated 10 to 12 times per minute. In this system, since the head of the affected person remains in upward position, the effect of artificial respiration can be seen immediately.

Tips

For men, give 20 to 25 pound pressure for 10 to 12 times. In case of women and children, the pressure should be 10 to 15 pounds for 10 to 12 times per minute. For very young children or infants, a pressure of 10–15 pounds should be 15 times per minute. This procedure should be continued till the affected person starts breathing.

Electrical emergencies

Electrical accidents cause countless injuries and claim many lives every year. Fig. 10.27 shows some of the impacts of electrical accidents

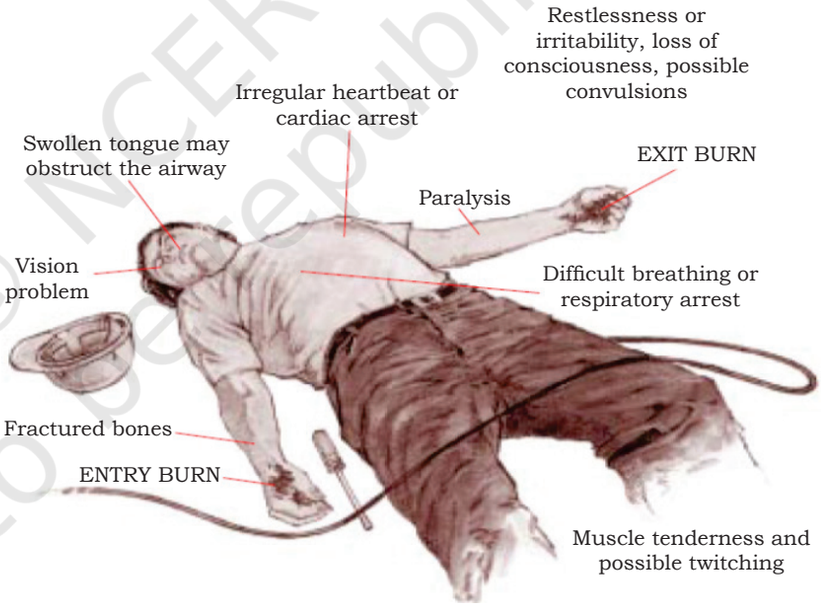

Fig.10.27 Health problems a worker suffers from after an electrical injury

The injuries could be minimised and many lives could be saved if appropriate rescue techniques and treatments are practised. Electrical accidents may occur at any time or place. Timely response and treatment of victims is a major concern. One must be able to judge the electrical emergency and the type of treatment that

needs to be given to the victim. Do you know the actions to take? Do you know what dangers could be encountered? When an electrical accident occurs due to muscle clamp, a victim is often incapable of moving or releasing the electrical conductor. Attempts to rescue the victim may pose a hazard for the rescuer as well. Caution must be a primary consideration in case of an electrical accident or emergency. There must always be an emergency response plan for scheduled electrical maintenance or work.

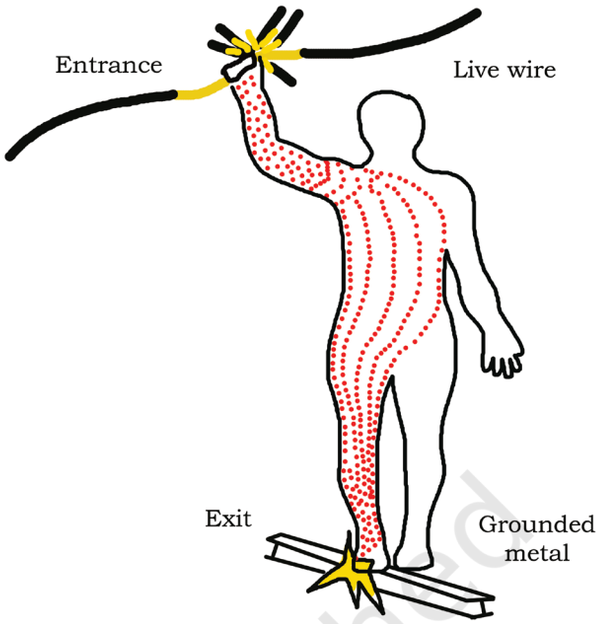

Fig. 10.28 Effects of electric current on human body

Rescue techniques

Approaching the accident

- Never rush to an accident situation.
- Get help of a trained electrical personnel, if possible.
- Approach the accident scene cautiously.

Examining the scene

- Visually examine victims to find out if they are in contact with energised conductors.
- Metal surfaces or objects near the victim or the earth itself may be energised.
- A person may get an electric shock, if one touches an energised victim or conductive surface. Therefore, do not touch the victim or conductive surfaces while they are energised.
- Stand on a dry rubber blanket or other insulating material.
- Do not touch the victim or conductive material near the victim until the power is turned off.
- Once power is off, examine the victim to determine if the person needs to be moved. Provide necessary first aid.

Fig. 10.29 Risk of electric shock in the control panel

Methods to de-energise

- De-energise electrical circuits as soon as possible.
- An extension or power cord probably powers portable electrical equipment. Unplug portable electrical equipment to stop the power supply.
- Open a disconnecting device or circuit breaker to de-energise fixed electrical equipment.

Hazards and solutions

- Be alert for hazards, such as stored energy, heated surfaces and fire.
- If one is unable to de-energise the power source, one must be careful while on the job.
- One must ensure that the hands and feet are dry.
- Wear personal protective equipment, such as rubber gloves and rubber shoes. Stand on a clean dry non-conductive surface.
- Use non-conductive material to rescue the victim in contact with a conductor.

High-voltage rescue

- Special training is required for carrying out rescue work if high-voltage is present.
- Protective equipment, such as rubber gloves and rubber shoes must be worn.
- use special insulated tools.

Insulated tools

- Insulated tools, with high-voltage ratings, are a lifesaver.
- Use devices, such as hot or shotgun sticks to remove the victim from energised conductors.
- In some cases, non-conductive rope or cord may be used to remove the victim from a conductor.

Check Your Progress

A. Multiple choice questions

1. Which of the following is not a type of artificial respiration?
   (a) Mouth-to-mouth
   (b) Mouth-to-nose

(c) Silverester's method
(d) Clear breathing

2. Which of the following human organs is the most affected from an electric shock?
   (a) Nervous system
   (b) Heart
   (c) Kidney
   (d) Stomach
3. In case of an electric shock, an unconscious man must be given _____ pressure for 10 to 12 times.
   (a) 20 to 25 pound
   (b) 15 to 25 pound
   (c) 10 to 15 pound
   (d) 25 to 30 pound
4. In case of an electric shock, an unconscious woman or child must be given _____ pressure for 10 to 12 times per minute.
   (a) 20 to 25 pounds
   (b) 15 to 20 pounds
   (c) 10 to 15 pounds
   (d) 5 to 10 pounds
5. Which of the following is used to heal a burn injury in case of electrocution?
   (a) Burnol
   (b) Soframycin
   (c) Both (a) and (b)
   (d) None of the above
6. Which of the following is not a type of bleeding?
   (a) Minor bleeding
   (b) Bleeding through the artery or main blood circulatory system
   (c) Bleeding from the veins
   (d) External bleeding
7. A first aid box must contain which of the following medicines?
   (a) Tincture iodine
   (b) Potassium permanganate
   (c) Sol-violate spirit
   (d) All of the above
8. What is/are the step(s) for using a fire extinguisher?
   (a) Identify the safety pin of the fire extinguisher, which is, generally, present in its handle.
   (b) Break the seal and pull the safety pin from the handle.
   (c) Use the fire extinguisher by pressing the lever.
   (d) All of the above
9. When do we use a fire extinguisher?
   (a) In case of flood
   (b) In case of electric shock
   (c) In case of fire
   (d) In case of burn injury

NOTES

10. Which of the following is a safety gear that a wireman must not have while working?
    (a) Safety boots
    (b) Gloves
    (c) Helmet
    (d) Belt
11. Which of the following is a poor conductor of electricity?
    (a) Aluminium
    (b) Copper
    (c) Wood
    (d) Silver
12. Which of the following safety gear is used for protecting the eyes?
    (a) Gloves
    (b) Helmet
    (c) Rubber shoes
    (d) Goggles
13. Which of the following safety gear must be worn while tripping a circuit breaker?
    (a) Gloves
    (b) Helmet
    (c) Rubber shoes
    (d) Goggles
14. Which of the following equipment have a discharge nozzle?
    (a) Control panel
    (b) Fire extinguisher
    (c) MCB
    (d) Switch
15. Which of the following provides the least resistive path for an electric current?
    (a) Earthing
    (b) Resistance
    (c) Capacitor
    (d) Inductor

B. Fill in the blanks

1. While working on electricity, the technician must wear _____ gloves and shoes.
2. Keep stretching the arms, legs, neck and back while working to ensure that they are not _____.
3. Unconsciousness due to electric shock may cause damage to the _____.
4. An electrocuted person must be given adequate water mixed with _____.
5. If a burn injury is due to _____, it must be cleaned and washed with spirit.
6. In case of electric shock, an infant must be given a pressure of _____.

7. Exhale from the mouth into the nose of a person needing artificial respiration slowly so that air enters the person's _____.
8. One of the causes of electric shock may be due to faulty _____ of electrical equipment.
9. Defective or inadequate insulation may cause _____.
10. Faulty current can be transferred to the ground by _____.
11. While working on a control panel, make sure that power is _____.
12. GFCI stands for Ground _____ Circuit Interrupter.
13. Copper is a _____ conductor of electricity.
14. Earthing is necessary in _____ and _____ equipment.
15. Do not touch the electrical panel with _____ hands.

C. State whether the following statements are True or False

1. Fire extinguishers for use on electrical fires will have a C, BC or ABC on the label.
2. Apply Burnol or Soframycin on the burnt body part of an electrocuted person and bandage it.
3. In Silverester's method, give 20 to 25 pound pressure for 10 to 12 times to a female.
4. Artificial respiration is Cardiopulmonary Resuscitation.
5. The body parts of an affected person must be kept straight and the person must be laid down on an uneven surface.
6. Fire extinguisher consists of a hand-held cylindrical pressure vessel, containing an agent, which can be discharged to extinguish a fire.
7. Check the rating and physical condition of the components and cables.
8. The aim of first aid treatment is to cool down the affected area rapidly to minimise damage and loss of body fluids.
9. Rubber is a good conductor of electricity.
10. Fire extinguisher is used in case of an earthquake.

D. Short answer questions

1. What are the factors that result in a hazard?
2. List the various preventive measures that need to be taken care of at a workplace to prevent electric shock.
3. How will you protect yourself from electric shock in a lightning storm?

4. List the various items that a first aid box must contain.
5. What is Sylverester's method?
6. What precautions are required to be taken during mouth-to-nose respiration?
7. How to perform artificial respiration?
8. How will you reduce the risk associated with handling of heavy and hazardous loads?
9. Write the names of different methods of artificial respiration.
10. List the first aid treatment that needs to be given in case of a burn injury.
11. Write down the steps for correct way of operating a fire extinguisher in case of a fire emergency.